BURGLAR ALARMS AND THE CHOICE BEHAVIOR OF BURGLARS: A SUBURBAN PHENOMENON

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ABSTRACT

Employing observation and deduction, the present study addressed the question of why some homes in a community are more likely targets for burglary. The period of observation spanned two-and-a-half years, in three Philadelphia suburbs. The townships differ in population density, distance from the city, and affluence. The deduced burglary model entails four decision points for the burglar: choice of neighborhood, choice of street, choice of property, and choice of point of entry. The neighborhood is chosen for its proximity to thoroughfares that are familiar to the burglar. Cul de sacs abutted by a wooded area or an abandoned railroad right-of-way, which offer opportunities for concealment, were targeted more frequently than other streets by burglars. Homes with high value and few target hardening attributes were more likely targets than other homes. Most burglars entered the targeted home through a first floor doorway. All other things equal, the presence of an alarm reduces the victimization rate. The alarm reduces the victimization rate to a greater degree as home value increases.

INTRODUCTION

The National Institute of Justice of the United States Department of Justice in its Research and Evaluation Plan for 1992 listed household burglary as a priority topic. The document contains the question "Why are some homes in a neighborhood more likely targets for burglary than others?" (U.S. Department of Justice, National Institute of Justice, 1992: 44). This question has intrigued geographers, criminologists, and regional scientists since the 1970s (Brantingham and Brantingham, 1984; Hakim, 1980; Reppetto,

1974). A primary research objective has been to learn how rational burglars choose their crime sites by taking into account the costs and benefits of their behavior (Cornish and Clarke, 1986). An important factor in this calculation is the effective precautions taken by property owners, including the installation of burglar alarm systems.

There are several possible approaches to the problem of identifying which homes are more likely to be burglarized. One method is to track where burglaries have occurred over a period of time in a confined geographical area and deduce possible behavioral patterns of burglars from that information (Hakim and Buck, 1991). An alternative method used to explain target choice is ethnographic research in which burglars are interviewed directly. Rengert and Wasilchick (1985; 1989), Bennett and Wright (1984), and Cromwell et al. (1991) interviewed either prison inmates or active burglars (who joined the researchers in their cars) to learn about their choices of targets, and they established generalized models of how burglars choose the homes they victimize. The problem with interviewing inmates is that they represent *only* the very small population of failed burglars. The problem with focusing on active burlgars is the small sample size and the nonrandom selection of burglars. Due to self-selection bias, the opinions of burglars still at large might not reflect the choice patterns of the whole population of burglars. Furthermore, except for the research of Rengert and Wasilchick (1985; 1989) and Bennett and Wright (1984), most of these studies were conducted in urban areas. There is a need to focus on suburbs, where a large proportion of society is housed.

The study reported here employed the first approach: the method of observation and deduction. The researchers analyzed all burglaries that occurred in a specified region, of which the police were informed, over a period of two-and-a-half years. The advantage of this approach is that it indirectly reveals the pattern of behavior of many burglars. It supplements and extends findings from the direct-interviewing-of-burglars approach by increasing the sample size and the area considered and by extending the research beyond

the city to the suburbs. The study was unique due to the rich data collected on the location and characteristics of burgled and nonburgled homes in the suburbs.

Another significant implication of this effort is its capacity to reveal those police and private security activities that might reduce burglaries in these communities. As a study that explicitly analyzed effects of the presence or absence of burglar alarms, it might assist suburban police in their support (or lack of it) for alarms, and it might provide scientific information to homeowners considering installation of such systems. Further, it has added the spatial dimension to the traditional models of Becker (1968) and Ehrlich (1973) to test not just whether a burglary is likely to occur but also where it is likely to occur. Introducing burglar alarms as a factor in the burglar's cost-benefit analysis adds to the cost side and might detract from the benefits (revenues) side. This enables further examination of whether burglars are indeed utility maximizers in their target choice.

METHODOLOGY

Three suburban localities in the Philadelphia, Pennsylvania metropolitan area were selected, which differ from one another in some of their key attributes (Table 1). Examination of differentiated communities allows some degree of generalization from the results. These localities were Tredyffrin Township in Chester County, Upper Merion Township in Montgomery County, and Springfield Township in Delaware County. Although the townships were not compared directly in the analysis described below, a brief sketch of each provides useful background on the settings of the homes that were analyzed. These townships may be conceptualized as outer, middle, and inner suburbs, respectively, in terms of their relative distance from the city of Philadelphia.

Tredyffrin Township is the farthest from Philadelphia. It has one-fourth the population density of the inner suburb of Springfield. It is nearly all white, with a relatively young

TABLE 1

DESCRIPTION OF THE THREE STUDY AREAS

Characteristic	Tredyffrin	Upper Merion	Springfield
Population (1980)	23,019	26,138	25,326
Density per square mile	1,086	1,476	4,026
% White	94.0	94.0	98.4
Median age	32.8	35.4	38.4
Number of housing units (1980)	8,235	9,271	8,367
Median home value	$98,700	$64,100	64,200
Average home sale price	$175,000	$135,000	144,000
	(1987)	(1987)	(1989)
Area (square miles)	21.2	17.7	6.29
Land use (percent)			
Residential	31.3	31.1	48.4
Commercial	1.4	3.8	3.4
Industrial	1.8	18.1	0.9
Parks and educational	9.2	17.9	13.8
Streets	13.0	15.6	14.0
Vacant	39.1	9.9	18.0
Other	4.2	3.7	1.5
Police (1990)			
Officers	47	53	32
Civilians	8	17	2
Budget (1989)	$2,849,626	$3,366,520	$1,853,606
Officers per 1000 population	2.04	2.03	1.26
Officers per square mile	2.22	2.99	5.09
Police operating expenses per capita	$123.79	$128.80	73.19
Police expenses *100/budget	25.51	24.30	19.43

Sources: 1980 Census of Population and Housing, Townships and Police Departments Annual Reports, Chamber of Commerce data.

median age. The median home value and average sale price of homes are over thirty thousand dollars greater than the figures for the other two townships. Tredyffrin has fewer retail establishments than the other two townships, but it is in the middle of the range for manufacturing. It has much more vacant land than the other two townships. It has 47 police officers, which is the largest number per capita but the smallest number per square mile of the three townships. This is a wealthy, well-serviced suburban community.

Upper Merion Township is located closer to Philadelphia than Tredyffrin Township but farther than Springfield Township. It is in the middle of the range for most other characteristics as well—such as population density, median age, and median home value. It has the largest number of retail establishments (which include the very large King of Prussia Mall) and the largest numbers of manufacturing establishments and police officers. It has the smallest amount of vacant land, and it is in the middle of the range for police officers per capita and per square mile.

Springfield Township is the inner-most suburb with respect to Philadelphia. It has nearly four times the population density of each of the other two townships, the oldest median age, and the fewest retail establishments, manufacturing establishments, and police officers in total and per capita. On the other hand, it has the largest number of police officers per square mile. It has the lowest median value for housing. Springfield Township is a blue-collar suburb of the city of Philadelphia.

This description illustrates the diversity of

the three suburban townships analyzed in this study. However, the townships were not compared directly in this analysis. All the data collected were based on individual homes. Sources of information included police files on the attributes of burglaries and alarm ownership, the county real estate assessment files, and questionnaires that were mailed to the individual homes. The questionnaires[1] were mailed, each with a letter signed by the local police chief, to all homes for which burglary reports had been made to the police in the two-and-a-half years prior to the study. Questionnaires also were sent to a random sample of 1,110 alarm owners and to a matched control group of adjacent homes that had not been burgled and in which there were no alarms. Of the total residential questionnaires mailed out, 766 were completed and returned by the homeowners, for a 42-percent response rate.

PATTERNS OF BURGLARIES

Economic theory suggests rational behavior on the part of burglars (Becker, 1968; Ehrlich, 1973; Hakim, 1980). Such rational agents weigh the expected costs and benefits of their actions. In the context of burglary, the criminal must assess the loot he or she is likely to remove from the premises. The burglar also must assess the likelihood of being caught, going to trial, and being convicted. Thus, a victimized home is chosen in a non-random fashion. That is not to suggest that a dispassionate observer can predict when a given home will be burgled. Only by analyzing a large number of burglaries is it possible to identify the common patterns of burglars' behavior.

Location of the residence is the single most important factor explaining the incidence of burglaries. Past research has shown that the locational choice of a burglary target appears to be made sequentially in four steps: the neighborhood, the particular street in the neighborhood, the specific property on the street, and the point of entry to the property (Brantingham and Brantingham, 1984; Reppetto, 1974).

The Neighborhood

Burglars choose to operate in familiar territory. The neighborhood is selected for its proximity to major arterial routes often used by burglars for work or leisure purposes (Rengert and Wasilchick, 1985). The visibility of properties and the ease of escape to busy thoroughfares when necessary are essential elements in the choice of neighborhood (Fink, 1969). In the present study, the attractiveness of a neighborhood as a target was measured in terms of its accessibility to the two main transportation arteries connecting each community to Philadelphia and/or Chester, Pennsylvania. These were the two busiest routes in each township. Accessibility was defined as location inside the corridor of homes that were within three blocks of these six major highways.

The present study's findings corroborated the past research of Fink (1969) and Rengert and Wasilchick (1985). The frequency of burglaries was greatest within three blocks of the two busiest routes in all three townships. Figure 1 illustrates that 40 to 50 percent of burgled homes were located within three blocks of major thoroughfares; however, only 25 percent of all homes were located within that corridor. Thus, the probability of being burlged was twice as high for homes located within three blocks of a major thoroughfare. This was particularly true if the thoroughfare connected to an area of lower-income households such as Philadelphia or Chester, Pennsylvania and/or if the route was of commercial importance. It seems that burglars prefer to operate along routes with which they are familiar and which can provide them with easy escape (Rengert and Wasilchick, 1985; Fink, 1969).

The Street

The type of street most often chosen by burglars was considered by Bevis and Nutter (1977) in Minneapolis. These researchers examined dead-end, L, T, and cross streets. All were located within this major urban area. Bevis and Nutter (1977) found that the streets in Minneapolis that were safest from burglary
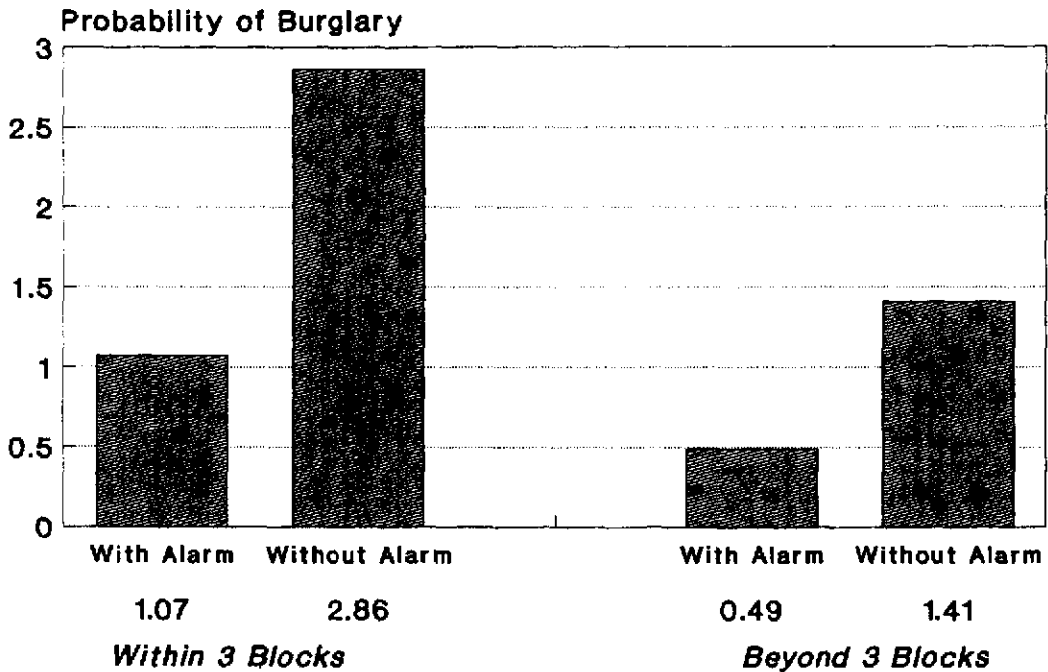
Probability of Burglary

Figure 1. Residential burglary and proximity to a thoroughfare.

were dead-end streets. Streets became more vulnerable to burglary as their level of accessibility increased—from dead-end to L to T to cross streets.

In the surburban example in the present study, it was found that burglars targetted well secluded streets. Cul de sacs, which typically are surrounded by woods or which might have an abandoned railroad right-of-way behind them, provide for concealed access. Properties on this type of road were 1.5 times more likely to be burgled when unalarmed than the average probability for unalarmed properties in the community. They were 2.2 times more likely to be burgled when alarmed than the average for alarmed properties. Therefore, in contrast to the findings of Bevis and Nutter (1977) for an urban area, the surburban data from this study showed that cul de sacs, which resemble dead-end streets, actually attracted burglars. This might have been due to their relative seclusion.

Newman (1972) found that close proximity to schools and convenience stores increased the probability of burglary greatly in Cleveland, Ohio. In contrast to that finding, the present surburban data indicated that close proximity to sites that are attractive places for youth to gather—such as schools, convenience stores, and other facilities that are popular for youthful activity—did not appear to explain frequent burglaries. The proposed explanation is that burglars in the suburbs like to avoid areas with a high volume of traffic. Also, most students in the suburbs are bused or driven to school, whereas in the city most students walk to school. Therefore, data from large cities might provide a different picture: there may be greater anonymity associated with a popular loitering location there.
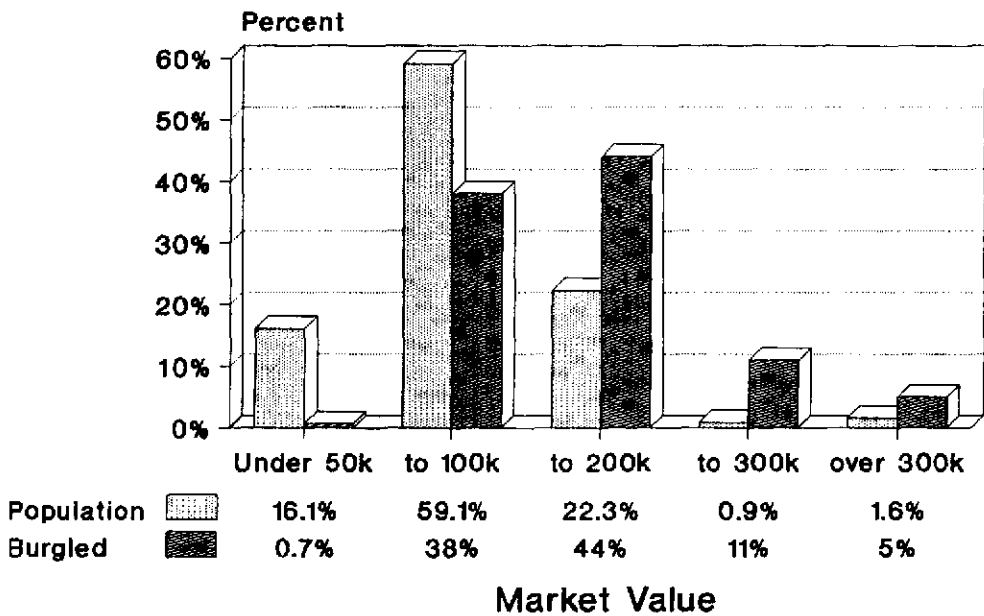
The Property

The third level of decision for the burglar is the choice of the particular target. The external attributes of a home constitute a set of signals pertinent to the lucrativeness of the possessions contained within. The U.S. Department of Justice concluded in its National

Crime Survey (1990) that " . . . households with higher income were more susceptible to crimes involving theft, and less susceptible to crimes involving violence, than were lower income households." On the other hand, Rengert (1989) found that urban burglars in Philadelphia were more likely to victimize low-income homes than wealthier homes.

The present findings on suburban burglaries were consistent with the national picture. Figure 2 and Table 2 illustrate that the burgled homes were more affluent than the general population of homes. Table 2 shows further that alarmed burgled homes were particularly expensive (column 1), not just in comparison with the population of homes and with burgled homes overall but even in comparison with the generally affluent population of alarmed nonburgled homes (compare column 1 with column 2 of Table 2). At the same time, a relatively moderate home in an expensive area was more vulnerable to burglary than a similar home in a moderate-income neighborhood. For example, note the burgled

homes that were not alarmed in Upper Merion Township. When this anomaly was examined, it was found that most of these less expensive homes were located in new townhouse developments in the Township. Townhouses in the suburbs seem to be particularly vulnerable. Townhouse developments were burlged eight times more frequently and their end units 18 times more frequently than would be expected based on their respective share in the housing stock.

An unexpected finding of this study was that there seemed to be a strong connection between years in residence and victimization (Figure 3). Burglars appeared to select neighborhoods in which the turnover of residents was high. Most burglaries occurred when homeowners were in the first year of residence, with declining, though still high, frequency through the first five years of residence. The reason might be that a burglar is less noticeable to neighbors when the new occupant is still unknown. Further, during a period of lengthy home construction or renovation in a neighborhood, a strange vehicle


	Under 50k	to 100k	to 200k	to 300k	over 300k
Population	16.1%	59.1%	22.3%	0.9%	1.6%
Burgled	0.7%	38%	44%	11%	5%

Market Value

Population Size ▪ 10869
Sample Size ▪ 140

Figure 2. Residential burglary and market value.

TABLE 2

AFFLUENCE AND BURGLARIZED HOMES

| | Alarmed | | Not Alarmed | |
Township	Burgled	Not Burgled	Burgled	Not Burgled
Tredyffrin				
Sale price	$240,795	$173,673	$131,916	$128,693
Upper Merion				
Sale price	$168,594	$155,772	$79,980	$125,364
Springfield				
Sale price	$79,525	$43,859	$55,898	$36,333
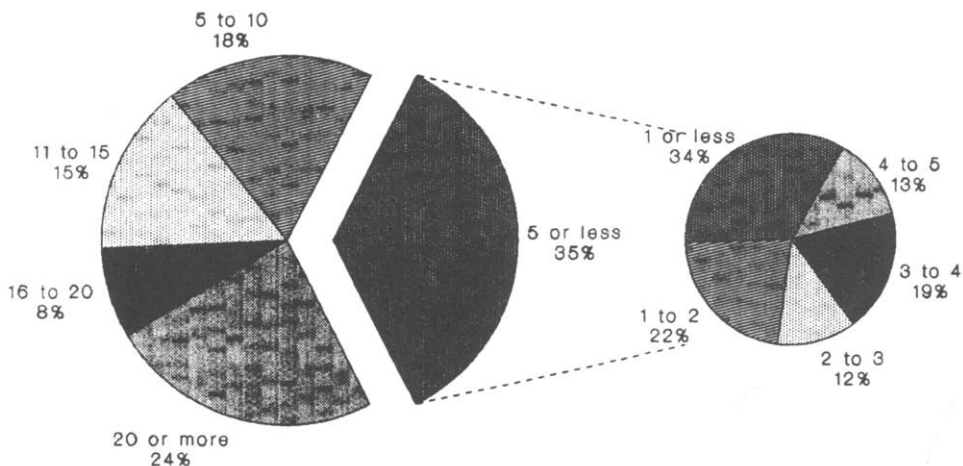
Sample Sizes are 364 and 112

Figure 3. Time in residence when burgled.

on the street or in a driveway does not attact suspicion.

An imporant factor in a burglar's decision is the constellation of security precautions taken by homeowners. Previous investigations by the present researchers (Hakim and Buck, 1991: 43–51) suggested that effective precautions should have three goals: deterrence, prevention, and detection. Thus, adequate security requires a package of a few precautions. From the wide variety of precautions owners of burgled and nonburgled homes were found to have taken, a subset was

identified that comprised an effective package: for deterrent value, there should be a car in the driveway, a yard sign from an alarm company, and exterior and interior lights (Buck, Hakim, and Porat, 1992). Ethnographic research showed findings consistent with these; over 90 percent of the informants stated that they would never enter a residence that they felt was occupied (Cromwell et al., 1991). Prevention requires deadbolt locks in solid or steel doors and pins to prevent the raising of sash windows. To detect intrusion, only an alarm will suffice, and it is especially

effective if it is connected to a central station. Surprisingly, the presence of a dog did not seem to have much deterrent effect; 37 percent of alarmed burgled houses reported having a dog. The percentages were 26 for non-alarmed burgled houses and 28 for the population as a whole.

Interestingly, alarm owners were more security conscious and took more precautions than did those who did not own alarms. Owners of alarmed homes that were burgled had relied almost exclusively on their alarms. For example, 2.8 times more members of the alarmed nonburgled group left cars in their driveways than did their burgled counterparts. In 40 percent of alarmed and burgled homes, no additional precautions had been taken in addition to the alarm. In alarmed nonburgled homes, significantly more precautions had been taken than in alarmed and burgled properties, where, in turn, more security precautions had been taken than among the population as a whole.

Alarmed homes that were burgled were exceptionally expensive and large (Table 2). They were located on even larger lots than were other burgled homes or alarm-equipped homes that were not burgled. It is likely that they were burgled by professionals. One would expect the value of the loot removed from the premises to be greater when alarmed homes are burgled since there is a positive association between wealth and alarm purchase. However, the present data show that the non-alarmed homes provided more loot for burglars. The average loss in alarmed homes was $741.00, and in nonalarmed homes it was $1,515.00. A likely reason is that burglars were limited to less than ten minutes when operating in alarmed homes because the suburban police were likely to arrive within that time.
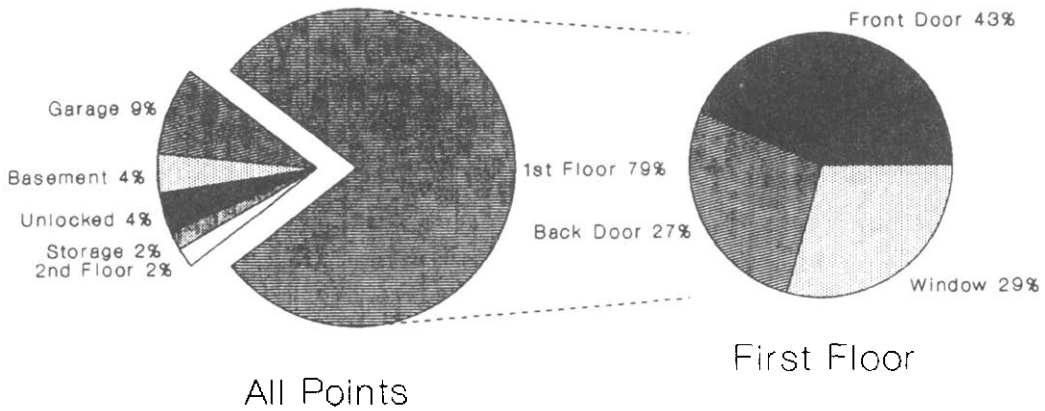
Point of Entry

The fourth level in a burglar's decision is to choose the point of entry (Figure 4). It appears that burglars spend no more than five minutes opening a door and three minutes opening a window (Reppetto, 1974). Walsh

(1980) estimated that 94 percent of the burglars in his research entered from the ground floor with 34 percent entering through a door and 60 percent entering through a window. Likewise, the burglars in the present study did not seem to show very much imagination; 79 percent entered through the ground floor, and of this group, 70 percent entered through the front or back door. Unlike the case in Walsh's (1980) study, only 9 percent entered through windows. This might suggest that burglars in the suburbs have more time to spend breaking into relatively secluded homes since Reppetto (1974) illustrated that doors require more time than windows to break through. Also, this might suggest that an alarm system that covers just the first floor might be adequate in most suburbs.

THE EFFECTIVENESS OF BURGLAR ALARMS

A basic question that has never been addressed in a methodologically sound fashion is whether alarms are effective in deterring intruders. A definitive answer to this question is a necessary but not sufficient condition for deciding whether communities should encourage alarm installation. The question for the sufficient condition is whether the net social benefits of alarms to the locality is positive. In order to address the first, necessary condition, the probabilities of burglary for alarmed and nonalarmed homes were computed. The probability that a property protected by an alarm would be burgled is the ratio of the number of properties that are burgled and alarmed to the number of alarmed properties in the community. The probability of a property that is unprotected by an alarm being burgled is the ratio of the number of burgled properties that do not have alarms to the number of nonalarmed properties. The ratio of the latter to the former probability exhibits the degree to which nonalarmed residences are less or more at risk of burglary.

Table 3 demonstrates that the burglary probability for nonalarmed residences was 2.71 times greater than that for alarmed homes

Sample Size•223

Figure 4. Point of entry—all residential properties.

(.0179/.0066). This was not the only noteworthy finding. Table 3 and Figure 5 illustrate that the higher the value of the residential unit, the greater the deterrent effect of an alarm. In Springfield, which is a working-class suburb with a median home value of $64,200.00, the probability of nonalarmed homes being burgled was 2.26 times higher than that of alarmed homes. Nonalarmed homes in Tredyffrin township that had values less than 100k were 2.65 times more likely to be burgled than alarmed homes. Nonalarmed homes in the upper range of value were 3.12 times more likely to be burgled than

the alarmed homes. Thus, the higher the value of the home, the more effective the alarm.

The environmental conditions that increase the chances of a home being burgled are location of the home, its absolute and relative affluence, seclusion from the street and neighbors, and security precautions. Alarms appear to reduce burglary, and their effectiveness (and hence value to insurers) rises with the value of the property.

CONCLUSIONS

This study utilized the method of observation and deduction to determine the kinds

TABLE 3

ANNUAL PROBABILITY OF VICTIMIZATION

Locality	P(B|A)		P(B|not A)	
	Residential	Commercial	Residential	Commercial
All three localities	.0066	.0166	.0179	.0759
Upper Merion	.0047	.0146	.0133	.0634
Springfield	.0039	.0278	.0088	.0381
Tredyffrin	.0104	.0477	.0306	.1548
Home value ≤ $100k	.0063	—	.0167	—
Home value > $100k	.0197	—	.0614	—

P(B|A): Probability of burglary for properties equipped with an alarm.
P(B|not A): Probability of burglary for properties that are not equipped with an alarm.

Percent

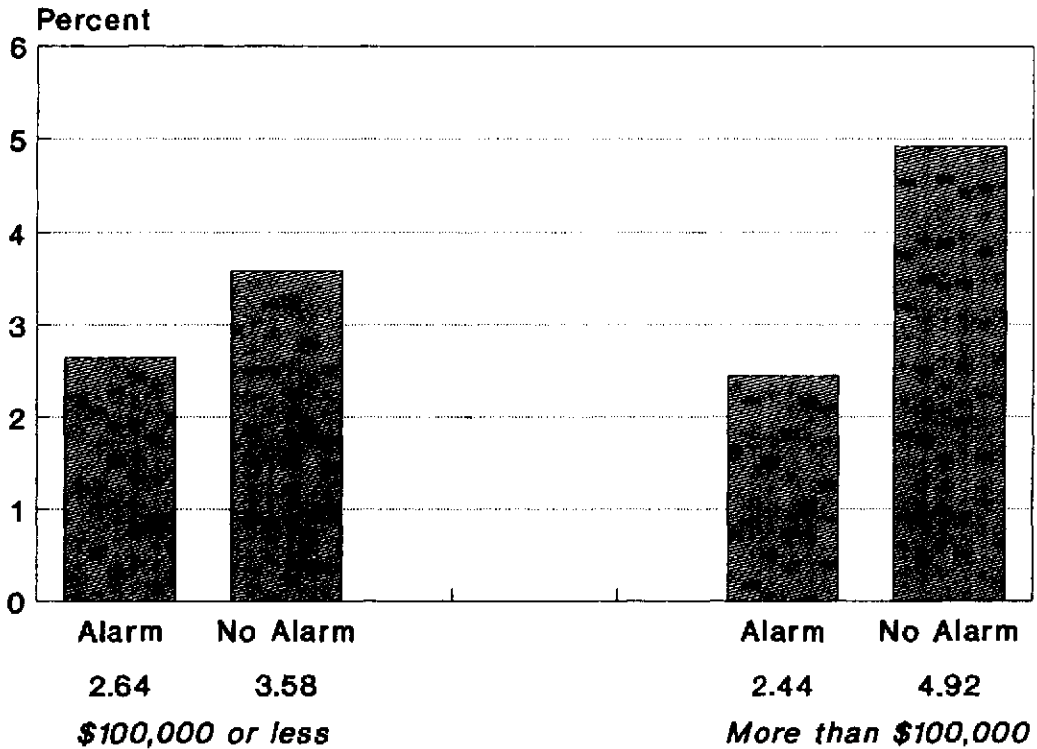| Alarm | No Alarm | Alarm | No Alarm |
| 2.64 | 3.58 | 2.44 | 4.92 |
| *$100,000 or less* | | *More than $100,000* | |

Figure 5. Burglary and home value.

of homes burglars chose to burglarize in three suburban townships of Philadelphia, Pennsylvania. The findings showed that burglars were likely to choose a home within three blocks of a major thoroughfare, a home located on a relatively secluded cul de sac, one more expensive than its neighbors, a home that had been purchased or rented recently, and one that did not have an alarm system installed. Some precautions based on folk wisdom were demonstrated not to be effective—dogs did not deter burglars in these suburbs; while other folk wisdom was validated—a car in the driveway, good lighting, and a home security sign on the lawn were important deterrents to burglars.

A critical question centers around the effectiveness of burglar alarms and the economic and social costs they entail for a community. For example, expensive police services are used in answering alarm activations, while the community saves if the alarms deter a crime that otherwise would be committed. It was illustrated that burglar alarms

are effective protection for home owners, especially those living in expensive homes. Therefore, burglar alarms seem to be cost-effective for the community, and police should encourage the installation of high quality alarms that are not activated in error.

Some issues regarding the deployment of police patrols in the suburbs also were highlighted. Police should not just patrol the major highways and business strips. Rather, patrols might concentrate on the three-block corridor of residential homes on either side of a major transportation thoroughfare during the hours of high vulnerability (9 to 11 A.M.; 1 to 3 P.M.) when many suburban residents are not at home. These are the hours when shops are open and protected by employees and customers; thus, shopping arteries might not require as much random routine patrol.

Finally, this study was an exploratory study to ascertain how well previous research that focused on urban areas was generalizable to the suburban situation. Some important differences were noted. Dead-end streets, where

there are fewer burglaries in the city, are more vulnerable in the suburbs. Living near a school increases vulnerability in the city but not necessarily in the suburbs. Further research is needed to identify those environmental conditions that are criminogenic only in certain types of neighborhoods or situations. In other words, the extent to which it is possible to generalize research findings from the inner city to the suburbs and vice versa remains to be determined. Indeed, much of the present research might be area-specific work in which generalization is very risky. This study identified only a few of these conditions.

NOTES

1. The interested reader may contact the authors for a copy of the questionnaire.

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